1 Comments on Concept Paper: An Updated Approach to AP Modularization

Some personal comments and discussion points for WG10 workshops.

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1.1 Technical Comments

1.1.1 Application activity models

In the AM guidelines section 3) states 'No activity model shall be specified in an AM.'

In the AP content section there is:

'an optional application activity model with diagrams'

Taking these two together it brings the possibility of an AP completely without any form of activity model - is this what is wanted?

I would suggest that if we really think AAM are useful that they should continue to be a non optional component of AP documents. Also, depending upon the scope of a particular AM there might be occasions when an AAM is appropriate in an application module, it seems a shame to disallow it.

1.1.2 EXPRESS

The only provision suggested for AIM EXPRESS in an AM is the equivalent of a short form schema. It is not clear whether, or not, an EXPRESS expanded listing is proposed as part of the electronic annex. The phrase used in the version 4 of AM guidelines is 'entire MIM and ARM EXPRESS short listings'. Presumably this permits USEFROM statements to other AMs to be included in the ARM EXPRESS but the values of this electronic version of the ARM must be questioned if it is not the intention that the ARM be directly implemented.

My opinion is that the inclusion as an electronic annex of the AIM EXPRESS expanded listing would provide a valuable resource for AP developers and testers. The sample Surface Appearance Wireframe module suggests in the heading for annex E that a single file contains both the ARM schema and the AIM schema, it would seem preferable that these should be provided as separate files.

1.1.3 Conformance requirements

The initial document is not clear on precisely what is intended to be included in the way of conformance requirements, test purposes and abstract test suites. The AM contents section includes a 'module implementation and usage guide annex' but the intended scope of this annex is not fully specified. There is, however, in the revised AP guidelines section of the initial document the statement that an AP shall have an associated integration test suite which should reuse the module test suites.

The conclusion I draw is that there is an intent to specify test purposes and abstract test suites for AMs, this seems a very useful addition to the current AIC content. The issues arising from this are:

- Should the test purposes and abstract test suite for an AM be published as part of the AM document or as a separate document?

- Does a conforming implementation of an AM mean anything?

- Should the AP ATS contain additional test purposes and test cases over and above those of its constituent modules?

I would suggest that since the AM documents are likely to be of a reasonable size it is best from the point of view of document proliferation and configuration control to have all the conformance related material as part of the AM document itself. For APs it seems likely that there will be a need for additional application area specific test purposes and test cases as well as those concerned with the interaction of a number of modules.

1.2 Discussion Points

1.2.1 AM to AM relationships

The stated intent is that AMs shall be used in their entirety by APs, I fully endorse this view but am less convinced by the statement in the AM guidelines that the USEFROM references to other AMs shall be to the entire AM. There is also in the mapping section the suggestion that mapping of an AM ARM construct to an MIM entity from another AM would be permitted. This would seem to create the possibility that the identical MIM instance could have different meanings in two AMs, this is not the best way of promoting interoperability.

In considering modularisation of the UoFs from the engineering analysis core model we find that there is a real requirement for ARM entities to be shared between UoFs, and consequently between AMs. There is no logical reason for including the entire AM. A typical example of this would be where a supertype is defined in one UoF and a complete set of subtypes is defined in another. A specific example is the definition of **numeric_object** in the description of property UoF (module) of the EACM and the detailed definition of all its subtypes in the numeric object UoF. There is no good reason for including the entire description of property module in the numeric object UoF. The interests of interoperability and consistency would seem to be best served here if the second AM were permitted to directly reference the definition from the first, this reference should of course include the mapping information. Any AP using both modules would then have an unambiguous interpretation for this construct.

The methodology hinted at in the guidelines document would produce a very large number of AMs containing the small (single entity?) intersections of other modules.

1.2.2 New EXPRESS definitions

The exact place of AMs in the STEP architecture should be carefully considered before the rules on what may, or may not, be done in the way of creating new MIM entities are finalised.

The rules currently proposed are similar to the restrictive rules applied to APs and in most cases prevent the creation of new subtypes with additional attributes. In the current STEP architecture we have generic resource parts, application resource parts, AICs and APs. The proposed modules already combine some of the features of AICs and APs, possibly they should also encompass features of the application resource parts since each module is likely to have some generic features and yet be related to a particular application field.

The AM development guidelines do not offer a solution to the problem of an AM ARM requirement which cannot be mapped to existing IRs. Presumably the politically correct answer is that existing IRs should be extended to include a new entity (probably a subtype with new attributes) to support the new requirement. This will take time and undermine any speed of development advantages of using AMs. Where there is a specific AM requirement for a new EXPRESS definition it seems much better to permit the definition to be included in the AM and so immediately available to any AP referencing this particular module in its entirety.

1.2.3   AMs and AICs

In order to support a truly modular definition of APs we should consider re-defining existing AICs as modules. This would require the addition of an ARM and mapping table to each of the current AICs but would bring with it the advantages of avoiding a repetition of different variations of corresponding ARM definitions in different APs so promoting interoperability. This may not be sensible for all the current AICs but those currently in the solids and surfaces area would seem to be very well suited to a modular approach. The work involved would be minimal since most of the necessary definitions and mapping data could be extracted from existing APs. (Parts 204 and 205 in the case of the B-rep and surface AICs.

1.2.4   Mapping to EXPRESS

The initial document offered the possibility of using EXPRESS-X to document, and make computer sensible, the mapping from ARM EXPRESS to MIM EXPRESS. This proposal has disappeared from the new guidelines document which offers only the old and unfriendly technology of the mapping table. As a personal view I find mapping tables difficult to write, difficult to write and virtually impossible to verify their completeness and accuracy. Should we not reconsider the possibility of using computer sensible mappings? We currently have the unsatisfactory situation where both the ARM and the MIM are required to be written in the computer sensible EXPRESS language but the mapping between the two is only offered in tabular form.

1.2.5   Modules and STEP parts

Should there be a one to one correspondence between modules and parts of ISO 10303? The current guidelines and initial samples of AM documents have the assumption that each module will be documented as a separate STEP part, the 600 series is being used for this purpose.

There is a considerable overhead attached to the development and standardisation of a part document both in terms of the pages of supporting material and the administrative overheads of sign-offs, organisation of ballots, national efforts in responding to the ballots and the tasks of

documenting the resolutions of the ballot comments. The initial proposals for modules in the areas of PDM and curve and surface presentation contain details of 46 separate modules with many inter-dependencies. It is not difficult to see how the list of potential modules could grow within 12 months to more than 100 with a typical AP user requiring to reference 50 or more of these. Taking the Surface Appearance Wireframe AM document as typical this contains 34 pages of which 4 pages are documenting the ARM and 1 page documents the MIM schema.

For current STEP parts containing EXPRESS schemas we have two distinct scenarios. APs and, to my personal regret, AICs contain a single EXPRESS schema. Resource parts on the other hand are permitted to contain any number of distinct but related schemas. This does not pose a problem for normative EXPRESS references via USE FROM or REFERENCE since these always refer to a particular schema by name.

There would seem to be a very good case for permitting a number of related application modules, particularly those with formal inter-dependencies, to be documented together in a single part of ISO 10303. A possible starting point for this would be to collect all the initial 11 draughting and presentation related modules into one document and to collect the PDM related modules into one or two part documents. The modules currently being considered in the area of engineering analysis would also form a natural grouping for publication as a single part. Provided the collection of modules is done in a logical manner it is likely that the required normative references, definitions and abbreviations would be relevant for the complete 'family' of modules.